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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,874	11/27/2002	Chia-Tien Peng	9788-US-PA	5275
31561	7590	03/07/2005	EXAMINER	
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE			FULLER, ERIC B	
7 FLOOR-1, NO. 100			ART UNIT	
ROOSEVELT ROAD, SECTION 2			PAPER NUMBER	
TAIPEI, 100			1762	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,874

Applicant(s)

PENG, CHIA-TIEN

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7-16 and 18-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7-16 and 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 7-14, 16, and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon

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layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Havemann teaches that porous silicon oxide has a lower thermal conductivity than solid silicon oxide. Porous silicon oxide obviously qualifies as "silicon oxide or the like", as taught by Kanaya. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize porous silicon oxide as an insulating layer. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

As the thermal conductivity of porous silicon oxide is less than solid silicon oxide, it inherently must be within the applicant's claimed range.

The applicant's admitted prior art, in view of Kanaya and Havemann, fails to teach aluminum oxide being included in the porous layer. However, it is taught by Havemann that porous silicon oxide has less mechanical strength than solid silicon oxide and there exists a need to strengthen the porous silicon oxide (column 2, lines 50-

55). Campion teaches that incorporating aluminum oxide increases the strength of silicon oxide. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include aluminum oxide in to the porous silicon oxide layer. By doing so, the mechanical strength of the porous silicon oxide is increased. To determine the exact amount of aluminum oxide to add would have been within the skill of one practicing in the art, through routine experimentation, in order to achieve the desired strength.

The proposed combination reads on at least having a greater grain size than a process without a barrier layer, which is sufficient to read on the applicant's claims.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

Claims 4 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217), Havemann et al. (US 5,747,880), and Campion et al. (US 6,201,917 B1), as applied to claims 1 and 10 above, and further in view of Haven et al. (US 6,380,670).

The applicant's admitted prior art in view of Kanaya, Havemann, and Campion teach the limitations of claims 1 and 10, as shown above. The combined references are silent to teach the deposition method of the porous silicon oxide layer. However, Haven

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teaches that porous silicon oxide may be deposited by e-beam evaporation. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to deposited the porous silicon oxide by e-beam evaporation. By doing so, one would have a reasonable expectation of success, as the combined references teach to deposit the porous silicon oxide and Haven teaches a method by which this may be done.

Claims 1-3, 5, 7-14, 16, and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Numata (US 5,519,250), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The

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insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Numata teaches that silica aerogel, a sol-gel derived silicon oxide, is very porous and has negligible thermal conductivity. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize silica aerogel in the above mentioned process. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

The applicant's admitted prior art, in view of Kanaya and Numata, fail to teach aluminum oxide being included in the porous layer. However, Campion teaches that incorporating aluminum oxide increases the strength of silicon oxide. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include aluminum oxide in to the porous silicon oxide layer. By doing so, the mechanical strength of the porous silicon oxide is increased. To determine the exact amount of aluminum oxide to add would have been within the skill of one practicing in the art, through routine experimentation, in order to achieve the desired strength.

The proposed combination reads on at least having a greater grain size than a process without a barrier layer, which is sufficient to read on the applicant's claims.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

Response to Arguments

Applicant's amendments overcome the 35 USC 112 rejections of the previous Office Action.

Applicant argues that the silicon oxide and aluminum oxide of Campion does not read on being an alloy. Applicant's states that an alloy requires a homogenous mixture and alléges that this is missing from Campion. This is argument not found convincing. Campion teaches to increase the silicon oxide by adding aluminum oxide. One of ordinary skill in the art would interpret the addition to be homogenous. If the addition were not homogenous, increased strength would only exist in portions of the silicon oxide layer and this would defeat the purpose of strengthening the layer.

Applicant argues that the exact ratio of silicon to aluminum is taught. This argument is not found convincing. It is noted that the claim requires "about" 95:5. It is the position of the examiner that the amount taught by Campion reads on "about". Additionally, Campion is relied on for teaching that aluminum oxide strengthens silicon

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oxide. Regardless of the amount of aluminum oxide Campion explicitly teaches, one of ordinary skill in the art would be motivated to determine the amount of aluminum to add in order to obtain the mechanical strength required by the particular process at hand. One of ordinary skill would understand that the mechanical strengths realized in Campion may not be sufficient for the Kanaya in view of Havemann process. Campion teaches the cause and effect relationship of aluminum increasing the strength of the silicon oxide layer. One of ordinary skill would have the motivation and ability to determine the amount of aluminum to add, through routine experimentation, in order to achieve the mechanical strength required for the particular process, absence evidence of criticality.

Conclusion

Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck, can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



EBF



TIMOTHY MEEKS
PRIMARY EXAMINER